

H10972

NOAA FORM 75-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. RA-02-01-00

Registry No. H-10972

LOCALITY

State Alaska

General Locality Taiya Inlet

Sublocality Skagway

2000

CHIEF OF PARTY
Commander D.R. Herlihy

LIBRARY & ARCHIVES

DATE

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|---|--|------------------------------------|
| NOAA FORM 77-28 (11-72) | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | REGISTER NO. H-10972 |
| HYDROGRAPHIC TITLE SHEET | | FIELD NO. RA-02-01-00 |
| INSTRUCTIONS The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office. | | |
| State <u>Alaska</u> | | |
| General Locality <u>Taiya Inlet</u> | | |
| Sublocality <u>Skagway</u> | | |
| Scale <u>1:2,500</u> Date of Survey <u>05/02/2000-05/03/2000</u> | | |
| <hr/> | | |
| Instructions Date <u>4/27/2000</u> Project No. <u>S-O905-RA</u> | | |
| <hr/> | | |
| Vessel <u>RA-1(2121), RA-3(2123), RA-6(2126)</u> | | |
| <hr/> | | |
| Chief of Party <u>Commander Dan R. Herlihy, NOAA</u> | | |
| <hr/> | | |
| Surveyed by <u>Rainier Personnel</u> | | |
| <hr/> | | |
| Soundings taken by echo sounder, , hand lead, pole <u>RESON 8101, SEABEAM 1180</u> | | |
| <hr/> | | |
| Graphic record scaled by <u>RAINIER Personnel</u> | | |
| <hr/> | | |
| Graphic record checked by <u>RAINIER Personnel</u> | | |
| <hr/> | | |
| Evaluation by <u>M. Lathrop, B. Olmstead</u> Automated plot by <u>HP Design Jet 1050C</u> | | |
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| Verification by <u>M. Lathrop, B. Olmstead</u> | | |
| <hr/> | | |
| Soundings in <u>Fathoms</u> at <u>MLLW</u> | | |
| <hr/> | | |
| REMARKS: <u>Time in UTC.</u> | | |
| <hr/> | | |
| <u>Revisions and annotations appearing as endnotes were</u> | | |
| <u>generated during office processing.</u> | | |
| <hr/> | | |
| <u>All depths listed in this report are referenced to</u> | | |
| <u>mean lower low water unless otherwise noted.</u> | | |
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Progress Sketch

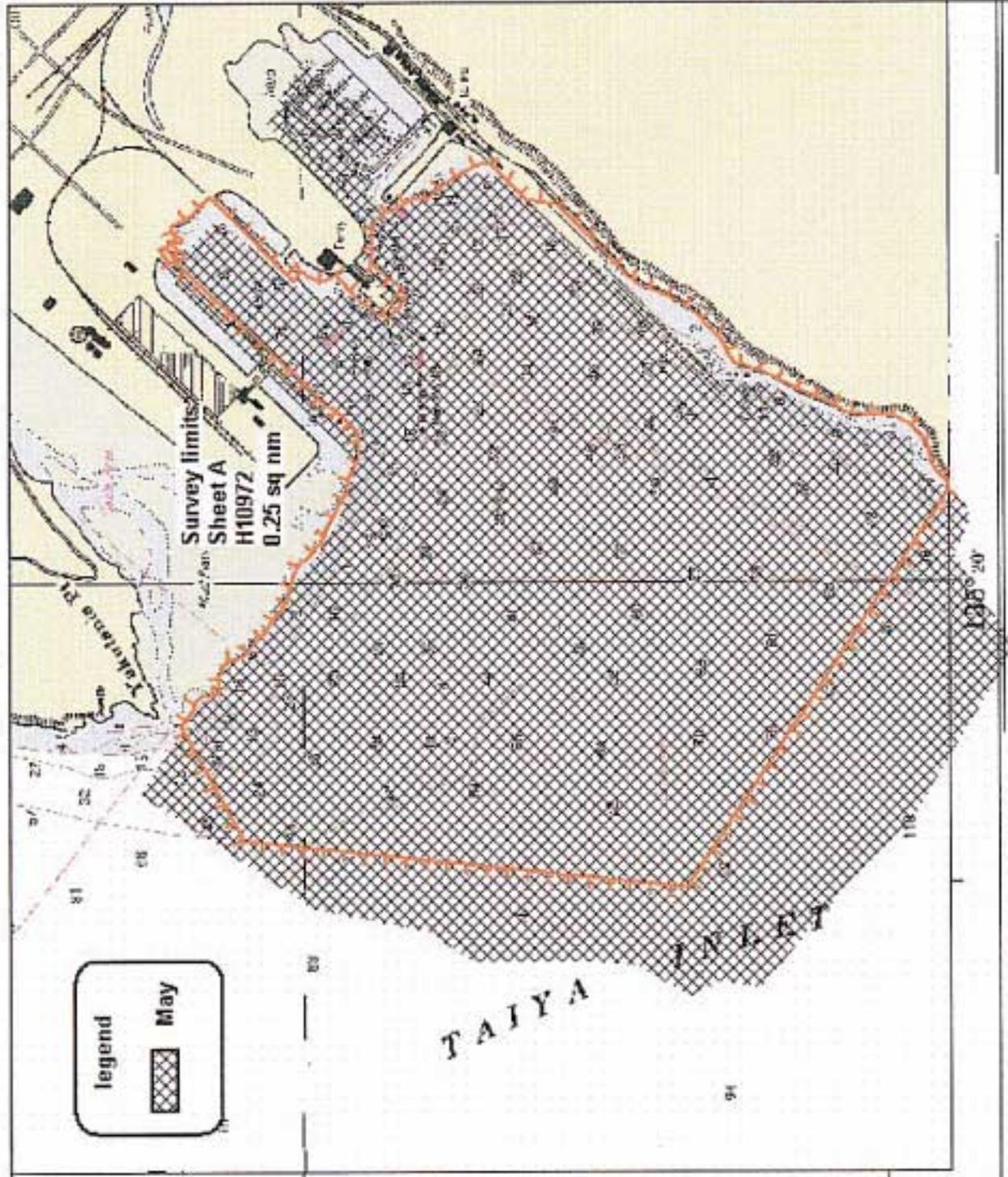
S-0905-RA
Skagway Harbor
ALASKA

May 2000

Chart 17317

NOAA Ship RAINIER
CDR Daniel R. Herlihy
Commanding

legend



| Accomplished | May |
|-----------------|-------|
| LNM Singlebeam | 0 |
| LNM Multibeam | 16.93 |
| SQ NM Singlebe. | 0 |
| SQ NM Multibeam | 0.33 |
| Total SQ NM | 0.33 |
| SV Casts | 3 |
| Bottom Samples | 0 |
| AWOIS Invest. | 0 |
| Tide gauges | 0 |
| Control station | 1 |
| Down time (hr) | 3 |
| Days at Sea | 3 |

Descriptive Report to Accompany Hydrographic Survey H10972

Project S-O905-RA-00¹ Skagway Harbor

Scale 1:2,500

May 2000

NOAA Ship RAINIER

Chief of Party: CDR Daniel R. Herlihy, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions S-O905-RA-00², dated April 27, 2000, and the Draft Standing Project Instructions dated April 6, 1998. This project responds to a request from the City of Skagway, Alaska and addresses concerns for the safety of increased commercial and cruise traffic in Skagway Harbor, Alaska. The purpose of this project is to provide contemporary hydrography with full-bottom multibeam coverage in Skagway Harbor, Alaska. Multibeam survey data from this special project will be used to enhance the resolution of the steep bottom slope and augment studies of a 1994 landslide.

The survey area is located at the northern end of Lynn Canal in Skagway and covers approximately 1.2 square kilometers of Skagway Harbor. Although not required, the original survey limits were revised to include the small boat harbor. The survey's northern limit is latitude $59^{\circ} 27' 15.05''^3$ N and the southern limit is latitude $59^{\circ} 26' 23.97''^4$ N. The survey's western limit is longitude $135^{\circ} 21' 02.01''^5$ W and the eastern limit is the $135^{\circ} 18' 48.99''^6$ W.

Data acquisition was conducted during the period May 2-3, 2000 (DN 123 to 124).

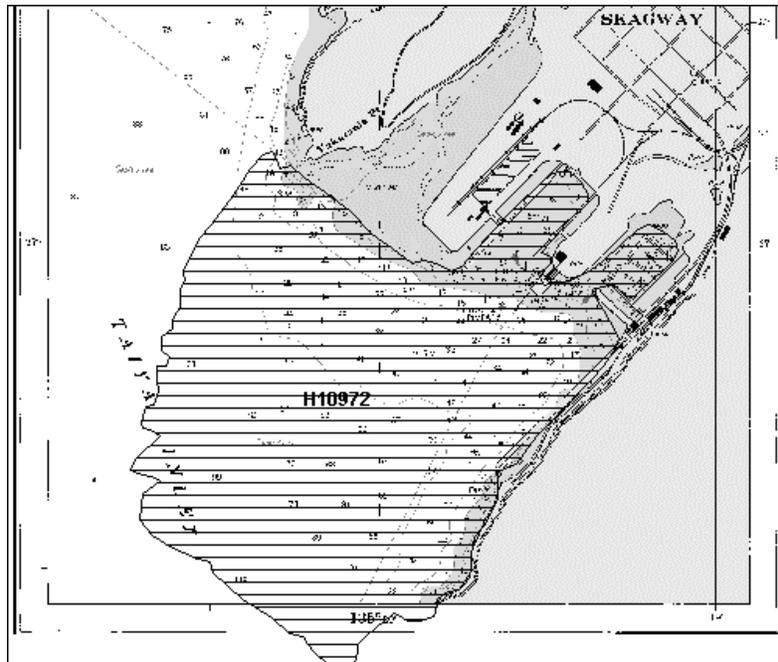


Figure 1: H10972 Survey Limits

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessels, quality control procedures, and data processing methods used during the acquisition of data for S-O905-RA are discussed in the following sections.

B1. Equipment and Vessels

Data were acquired by RAINIER's survey launches (vessel numbers 2121, 2123, and 2126). These three vessels were used to acquire shallow-water multibeam soundings and sound velocity profiles. Vessel 2123 also acquired detached positions.

Launch Shallow-Water Multibeam (SWMB) - VN 2121, 2123, and 2126

Vessels 2121 and 2126 are equipped with a hull-mounted Reson SeaBat 8101, with option 033, Angle-Independent Imagery, and option 040, Extended Range Projector. The SeaBat 8101 is a 240 kHz multibeam system that measures relative water depths across a 150° swath, consisting of 101 individual 1.5° x 1.5° beams. This system was used to obtain full-bottom coverage in depths generally from 4 meters to 100 meters, with range scale values ranging from 75 meters to 500 meters, depending upon the depth of water and across-track slope.

Vessel 2123 is equipped with a hull-mounted SeaBeam/Elac 1180, which is a single frequency (180 kHz), multibeam echo sounder system for shallow and intermediate water depths. The transducer assembly consists of two arrays; one starboard and one port, each mounted at a 38° angle from horizontal. The SeaBeam 1180 transmits utilizing both transducer arrays pinging into 14 sectors. The receiving beamformer generates 3 narrow beams within each sector with a beam width of 1.5° and a spacing of 1.25°. Three subfans are one total fan. Hence, there are 14 sectors x 3 beams x 3 subfans resulting in 126 total beams (at an acquisition swath width of 151°). The SeaBeam/Elac 1180 was generally used in depths ranging from 100 to 200 meters with an acquisition swath width dependent on the depth -- generally 131°. Swath width was often reduced further when surveying along steep slopes in order to reduce noise from missed pings occurring down slope.

Side Scan Sonar

Side Scan Sonar (SSS) equipment was not used on this project. However, it should be noted that the Reson Seabat 8101 and the SeaBeam 1180 systems provide a low-resolution digital SSS record of the multibeam swath. This SSS imagery is primarily used during processing of the multibeam depth data to aid in determining whether anomalous soundings are true features or noise.

Positioning Equipment

Vessels 2121, 2123, and 2126 are equipped with a TSS POS/MV Position and Orientation Sensor to measure and calculate position. The POS/MV is a GPS-aided inertial navigation system, which provides a blended position solution derived from both an Inertial Motion Unit (IMU) and an integrated GPS receiver. The IMU and GPS receivers are complementary sensors, and data from one are used to filter and constrain errors from the other, resulting in higher position accuracy and fewer errors than either system alone. Position accuracy is displayed in real-time by the POS/MV software and was monitored to ensure that positioning accuracy requirements as outlined in the NOS Hydrographic Surveys Specifications and Deliverables were not exceeded. In addition, the POS/MV software displays HDOP and number of satellites used in position computation. Data acquisition was generally halted when an

HDOP of 2.5 was exceeded or the number of satellites available dropped below 4. However, because positional accuracy can be maintained by the POS/MV through short GPS outages with the help of the IMU, data acquisition was not halted during short periods of time when the HDOP and number of satellites used exceeded stated parameters.

Software

Shallow-water multibeam (SWMB) echo sounder data, along with position and attitude data from the POS/MV, were acquired using Triton-Elics' ISIS software version 4.54, and processed using Universal Systems Limited's CARIS HIPS software version 4.3.2, running on a Silicon Graphics Inc. Origin 2100 with the Irix 6.5.2 operating system. Detached positions (DPs) were acquired with HYPACK MAX in the format of target ("*.tgt") files and processed with HPS.

Coastal Oceanographic's HYPACK MAX was utilized for vessel navigation and line tracking during acquisition of shallow-water multibeam (SWMB) data.

Final detached positions (DPs), features, and soundings were saved in MapInfo format and will be submitted with the digital data.

Raw sound velocity data were processed using VelocWin 5.03 supplied by the NOS Hydrographic Systems and Technology Programs N/CS11 (HSTP). VelocWin 5.03 uses raw salinity, temperature, and pressure measurements to create a sound velocity profile.

A complete list of software and versions is included in Appendix V⁷.

B2. Data Processing and Quality Control

Shallow-water Multibeam Data

Shallow-water multibeam data were monitored in real-time using the 2-D and 3-D data display windows in Isis, the on-screen display for the Reson SeaBat 8101 sonar processor, and the Elac HydroStar Online bathymetry data display. Adjustable user parameters are range scale (for both the Elac/SeaBeam 1180 and the Reson 8101), power, gain, and pulse width (for the Reson 8101), and swath width and bottom slope type (for the Elac/SeaBeam 1180). These parameters were adjusted as necessary to ensure the best data quality. Additionally, vessel speed was adjusted as necessary, and in accordance with the NOS Specifications and Deliverables and Draft Standing Project Instructions to ensure the required along-track coverage for object detection.

Following acquisition, shallow-water multibeam data were initially reviewed with the CARIS Hydrographic Data Cleaning System (HDCS) program SwathEdit. All soundings were reviewed, ping-by-ping, and obvious depth fliers were identified and manually flagged as "rejected". Vessel positioning and attitude data from each system were similarly displayed and manually cleaned. Fliers or gaps in positioning and attitude data were rejected and interpolated for small periods in time and outright rejected for larger periods in time in which the characteristic of the curve was ambiguous. All soundings beyond a maximum angle of 60° off-nadir were rejected in accordance with the Draft Standing Project Instructions to reduce the noise and refraction errors possible in these outer beams.

After review and cleaning in SwathEdit, depth, position and attitude data were merged, using the HDCS program HDCSLineMerge, with sound velocity, tide, vessel offset, and dynamic draft correctors to compute the corrected depth and position of each sounding. All soundings were then again reviewed, and spatially referenced in HDCS Subset Mode. Data were compared with adjacent lines and crosslines, for

systematic errors such as tide or sound velocity errors. Questionable soundings were also compared with adjacent or overlapping data for confirmation or further rejection. Depth fliers and noisy data, which were not rejected in SwathEdit, were rejected in Subset Mode.

A 3-meter sun-illuminated Digital Terrain Model (DTM) image was created to demonstrate coverage and to further check for systematic errors such as tide, sound velocity, or attitude and/or timing errors.

A statistical analysis of all SWMB data was performed using the CARIS Quality Control Report (QCR) function. SWMB crosslines were compared with mainscheme soundings, beam-by-beam, to statistically determine the accuracy of each beam. Beams not meeting accuracy requirements as described in the NOS Hydrographic Surveys Specifications and Deliverables were further filtered and rejected. Results from the survey's QCR can be found in Appendix V⁸. Crosslines were only run in areas of regular and even bathymetry in order to utilize the lowest variance in the analysis and to eliminate possible skew of the results due to irregular bathymetry.

To produce the final reduced data set represented by the final field sheet, all non-rejected soundings having passed all other quality-assurance checks were imported into a CARIS "workfile" by selecting shoal-biased "line-by-line" binning using a 3-meter cell size. The resultant thinned data were then imported into HPS where they were combined with heights of point features. Verified observed tides fully adjusted for the tidal zoning scheme supplied with the Letter Instructions were applied in HPS, and the processed soundings were excessed in HPS ZoomEdit using a 3.5-millimeter character size, ensuring that the largest spacing between selected soundings would not exceed 5 millimeters at survey scale. Final selected soundings were saved and plotted in MapInfo at a 2-millimeter character size.

Vertical Beam Echosounder Data

Although VBES data were not processed for this project, VBES data were acquired concurrently with launch multibeam data and were compared to nadir beams of multibeam in real-time during data acquisition to assure multibeam data quality. Digital VBES depth data are also used by Isis to assist the Reson 8101 in filtering depth fliers in real-time.

Data processing flow diagrams are included in Appendix V⁹ of this report.

Crosslines

SWMB crosslines totaled 1.3 nautical miles, comprising 7.8% of SWMB hydrography. The Quality Control Report (CARIS HIPS) for the checkline file averaged 98%, with a depth tolerance factor of 0.023, which conforms to International Hydrographic Organization Order 2 specifications as detailed in Special Publication S-44, Edition 4. Two additional Quality Control Reports were generated, one for each of the systems used during this survey. Using the same depth tolerance factor of 0.023 and a constant depth error of 1.0 meter, the Reson (vessels 2121 and 2126) checkline file averaged 99% and the Elac (vessel 2123) checkline file averaged 86%. See Appendix V¹⁰ for the detailed reports.

Junctions

There are no contemporary survey junctions with H10972.¹¹

Data Quality Factors

No unusual conditions were encountered during the survey that affected the expected accuracy and quality of survey data.¹²

B3. Corrections to Echo Soundings

Sound Velocity

Sound velocity profiles were acquired with Sea-Bird Electronic's SEACAT SBE19 Conductivity, Temperature, and Depth (CTD) profiler (S/N 2543). Raw conductivity, temperature, and pressure data were processed using the program VelocWin version 5.03, which generates sound velocity profiles for CARIS and sound velocity corrector tables for HPS. Sound velocity correctors were applied to SWMB soundings in CARIS. The calibration report and dates are included in Section III of the *Separates to be included with Survey Data*.

The speed of sound through water was determined by a minimum of one cast every four hours of SWMB acquisition in accordance with the Draft Standing Project Instructions and NOS Specifications and Deliverables for Hydrographic Surveys. Casts were conducted more frequently when changing survey areas, or when it was felt that conditions, such as a change in weather or tide, would warrant additional sound velocity profiles.

Vessel Offsets and Dynamic Draft Correctors

The following table shows when the vessel offsets and dynamic draft correctors used for this survey were last determined:

| Vessel No. | Date of Static Draft and Transducer Offset Measurements | Method of Settlement and Squat Measurement | Date of Settlement and Squat Measurement | Location of Settlement and Squat Measurement |
|------------|---|--|--|--|
| 2121 | March 1999 | OTF* | March 1999 | Port Angeles, WA |
| 2123 | March 2000 | Rod leveling | March 2000 | Shilshole Bay, WA |
| 2126 | March 1999 | OTF* | March 1999 | Port Angeles, WA |

*OTF: "On-the-fly" GPS techniques

Sensor offset and dynamic draft values were applied to Detached Positions in HPS and to SWMB data in CARIS during post-processing. These values are stored in HPS offset tables and CARIS Vessel Configuration Files (VCFs). Vessel offset diagrams and dynamic draft tables are included in Section V of the *Separates to be included with Survey Data*. The VCFs themselves are included with the digital HDCS data.

Heave, Pitch, Roll and Heading, Including Biases and Navigation Timing Errors

SWMB launches (VN 2121, 2123, and 2126) utilized a TSS POS/MV Model 320 Position and Orientation System – Marine Vessel (POS/MV), which provides accurate navigation and attitude data to correct for the effects of heave, pitch, roll and heading. The POS generates attitude data in three axes (roll, pitch and heading) to an accuracy of 0.05° or better. Heave measurements supplied by the POS/MV maintain an accuracy of 5% of the measured vertical displacement for movements that have a period of up to 10 seconds. The POS/MV delivers heading measurements by two distinct methods. First, the Dynamic Heading Alignment determines the vessels heading by using the data supplied by the Internal Measurement Unit (IMU) and GPS receivers to achieve heading that is, at best, accurate to within 0.25°. This method suffers from drift but is relatively unaffected by noise. Second, the GPS Azimuth Measurement System (GAMS) determines the geographic vector between two GPS antennas fixed to the

vessel by comparing the phase of satellite signals they receive. The error from this method is largely due to noise, but exhibits no drift. The POS/MV uses the advantages of each method to compensate for the disadvantages of the other to arrive at an optimal accuracy of 0.05°. Serial numbers are located in Appendix V¹³.

Vessel 2123 is equipped with a later model POS/MV version 3, which was newly introduced in 2000. Due to still unresolved technical difficulties, on numerous occasions the POS/MV was unable to obtain a GAMS solution to the baseline vector between the master and slave GPS antennae. At these times the heading value was derived solely from the IMU and was accurate to at best 0.25°. During these periods the heading accuracy was closely monitored using the POS/MV software to ensure that it never exceeded 0.5° as stated in the NOS Specifications and Deliverables for Hydrographic Surveys. On the vast majority of these occasions, heading accuracy was maintained at 0.35° or better. Because the accuracy decreases over time as a result of the drift of the IMU, “figure-8” maneuvers were performed after several survey lines to reinitialize the IMU and obtain better accuracy. These data were very closely inspected in HDCS to ensure the quality of position and heading data.

Heave, roll, pitch, and navigation latency biases were determined during Patch Tests conducted off Shilshole Bay, WA on March 6, 2000 for vessels 2121 and 2126, and in Steamer Bay, AK on April 12, 2000 for vessel 2123. SWMB vessel offsets, dynamic draft correctors, and system bias values are contained in CARIS Vessel Configuration Files (VCFs) and were created using the program “VCFEDIT” in CARIS. These offsets and biases are applied to the sounding data during processing in CARIS. The VCFs and Patch Test data are included with the digital HDCS data.

C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H10972 can be found in the *S-O905-RA-00 Vertical and Horizontal Control Report* submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS was the sole method of positioning. RAINIER personnel established a portable DGPS reference station at station T-187 (59° 27' 21.55" N, 135° 19' 30.56" W). In addition, differential corrections from the US Coast Guard beacon at Gustavus (ID# 892) were utilized during this survey. See the *S-O905 Vertical and Horizontal Control Report* for more information.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating tide station at Skagway, Alaska (945-2400) will serve as control for datum determination and provide reducers for this project. There were no subordinate tide gauges required for this project.

The Pacific Hydrographic Branch will apply final approved (smooth) tides to the survey data during final processing. A request for delivery of final approved (smooth) tides for survey H10972 was forwarded to N/OPS1 on May 15, 2000 in accordance with FPM 4.8. A copy of the “Request for Approved Tides/Water Levels” is included in Appendix IV¹⁴ of this report.¹⁵

D. RESULTS AND RECOMMENDATIONS

D.1 Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items assigned to this project.¹⁶

D.2 Chart Comparison

Two charts are affected by this survey:

| Chart | Scale | Edition Number | Date | Datum |
|-------------|-----------|------------------|-----------------------------|-------|
| 17317 | 1:77,182 | 18 th | June 14, 1997 | NAD83 |
| 17317 inset | 1:10,000 | 18 th | June 14, 1997 ¹⁷ | NAD83 |
| 17300 | 1:209,978 | 28th | September 12, 1998 | NAD83 |

Depths from chart 17317 inset agree well with the current survey in depths less than twenty fathoms, generally within one fathom. In depths greater than twenty fathoms, and primarily offshore of the White Pass and Yukon Corporation's commercial wharf, the differences increase to four and five fathoms, with the present survey soundings generally deeper than charted soundings. Notable differences are discussed below.¹⁸

In the vicinity of a charted 4 1/4-fathom sounding at 59° 26' 30.23"N, 135° 19' 44.86"W (481333.58 E, 6589286.82 N) the present survey revealed a depth of 1.6-fathoms (Pos. #124058)¹⁹. This area is close to shore and was covered with 100% shallow-water multibeam. This shoal was not considered a danger to navigation.²⁰

In the vicinity of a charted 5-fathom sounding at 59° 27' 03.93"N, 135° 20' 13.5"W (480887.66 E, 6590331.50 N) the present survey revealed a depth of 8.7-fathoms (Pos. #106021). This area was covered with 100% shallow-water multibeam.²¹

In the vicinity of a charted 13-fathom sounding at 59° 27' 02.61"N, 135° 20' 15.3"W (480859.10 E, 6590290.82 N) the present survey revealed a depth of 16.8-fathoms (Pos. #84294)²². This area was covered with 100% shallow-water multibeam.²³

In the vicinity of a charted 7-fathom sounding at 59° 26' 34.75"N, 135° 19' 44.34"W (481342.46 N, 6589426.59 W) the present survey revealed a depth of 12.4-fathoms (Pos. #118969). This area was covered with 100% shallow-water multibeam.²⁴

In the vicinity of a charted 38-fathom sounding at 59° 26' 28.42"N, 135° 19' 57.73"W (481130.54 N, 6589231.84 W) the present survey revealed a depth of 51-fathoms (Pos. #133579)²⁵. This area was covered with 100% shallow-water multibeam.

In the vicinity of a charted 45-fathom sounding at 59° 27' 04.81"N, 135° 20' 24.07"W (480721.32 N, 6590359.57 W) the present survey revealed a depth of 56-fathoms (Pos. #88719). This area was covered with 100% shallow-water multibeam.²⁶

In the vicinity of a charted 99-fathom sounding at 59° 26' 38.72"N, 135° 20' 28.88"W (480641.43 N, 6589552.93 W) the present survey revealed a depth of 86-fathoms (Pos. #133977)²⁷. This area was covered with 100% shallow-water multibeam.²⁸

In the vicinity of a charted 118-fathom sounding at 59° 26' 29.27"N, 135° 20' 24.61"W (480707.20 N, 6589260.27 W) the present survey revealed a depth of 102-fathoms (Pos. #91692)²⁹. This area was covered with 100% shallow-water multibeam.³⁰

In the vicinity of a charted 78-fathom sounding at 59° 26' 48.97"N, 135° 20' 33.54"W (480569.65 N, 6589870.36 W) the present survey revealed a depth of 69-fathoms (Pos. #140121). This area was covered with 100% shallow-water multibeam.³¹

The current survey was also compared to chart 17300. A prominent landmark in Skagway is a gold cupola. This landmark is abbreviated as "CUP" on chart 17300 and the Hydrographer recommends using the label "CUPOLA" to be consistent with larger scaled charts. Due to the small scale of this chart, a reasonable comparison of soundings to this survey was not practical.³²

Final sounding comparisons will be made at Pacific Hydrographic Branch after application of smooth tides.

D.3 Shoreline

Method of Shoreline Verification

No remote sensing source shoreline data were supplied for this project.³³ Features and shoreline shown on the 18th edition of chart 17317 were digitized in MapInfo by RAINIER personnel and displayed in Hypack for field verification. Charted shoreline and features were compared with existing shoreline and features in accordance with the Letter Instructions.

Detached positions (DPs) taken during shoreline verification were recorded in HYPACK and on DP forms³⁴, and processed in HPS. These indicate revisions to features, and features not found on the chart. DP forms are included in Section V of the *Separates to be included with Survey Data*.

A detailed Detached Position Plot³⁵, in both paper copy and MapInfo format, is provided showing all detached positions with notes relating to each feature. The updated shoreline and features are also depicted on the final sounding plot.³⁶

Shoreline Changes and New Features

The following changes and new features to the charted shoreline were found and are depicted on the final DP plot:³⁷

The new extents of a charted pier are located on the south side of Skagway Harbor in the vicinity of the White Pass and Yukon Corporation's commercial wharf (Pos. # 30003-30006). Within the same general area are two obstructions charted at 59° 26' 37.42" N, 135° 19' 39.43" W and 59° 26' 38.28" N, 135° 19' 39.68" W. These two obstructions were not accessible for investigation due to the construction of a new catwalk (Pos. # 30000-30002) that connects to shore and restricts navigation. Since these obstructions are located in a non-navigable area and no longer considered dangers to navigation, the Hydrographer recommends removing them from chart 17317 inset.³⁸

The new extents of a charted pier are located on the north side of Skagway Harbor (Pos. # 30012-30013). A new pier and catwalk extend beyond this pier (Pos. #30010-30011, 30014-30015, and 30008-30009). The construction of this new pier and catwalk has replaced a pile charted at 59° 26' 57.14" N, 135° 19' 47.43" W and two dolphin charted at 59° 26' 58.09" N, 135° 19' 43.8" W and 59° 26' 58.99" N, 135° 19'

43.23" W. The Hydrographer recommends removing the charted pile and two dolphin from chart 17317 inset and charting the new pier and catwalk.³⁹

A pile charted at 59° 26' 41.58" N, 135° 19' 36.11" W (Pos. #30007) and a pier charted at 59° 27' 05.93" N, 135° 19' 25.74" W (Pos. #30018) were not found. The Hydrographer recommends removing both the charted pile and the pier.⁴⁰

Recommendations

The Hydrographer recommends that the shoreline as depicted on the DP plot⁴¹ and final sounding plot⁴² supersede and complement shoreline information compiled on the chart as noted. These revisions are recorded in the MapInfo digital files named "H10972_Chartedshoreline" and "H10972_ShorelineUpdates". Digital images in JPG format with filenames corresponding to the fix number are included with the digital data and are provided to aid compilation.⁴³

D.4 Dangers to Navigation⁴⁴

Three Dangers to Navigation were found and reported to the Pacific Hydrographic Branch on August 16, 2000, for verification and final submission to the Seventeenth Coast Guard District.

A copy of the preliminary Danger to Navigation Report is included in Appendix I.⁴⁵

D.5 Aids to Navigation

All aids to navigation within the survey limits were found to be correctly charted and serve their intended purpose.⁴⁶

D.6 Prior Surveys

The following prior surveys share common area with survey H10972:⁴⁷

| <u>Survey</u> | <u>Scale</u> | <u>Year Surveyed</u> | <u>Datum</u> |
|---------------|--------------|----------------------|----------------------|
| H04226 | 1:40,000 | 1922 | Valdez ⁴⁸ |
| H06945 | 1:2,000 | 1943 | NAD27 ⁴⁹ |
| F00057 | 1:1,000 | 1945 | NAD27 ⁵⁰ |
| F00071 | 1:2,000 | 1948 | NAD27 ⁵¹ |
| F00084 | 1:2,000 | 1950 | NAD27 ⁵² |
| F00358 | 1:5,000 | 1990 | NAD83 |
| F00416 | 1:5,000 | 1995 | NAD83 ⁵³ |
| H10806 | 1:10,000 | 1998 | NAD83 |

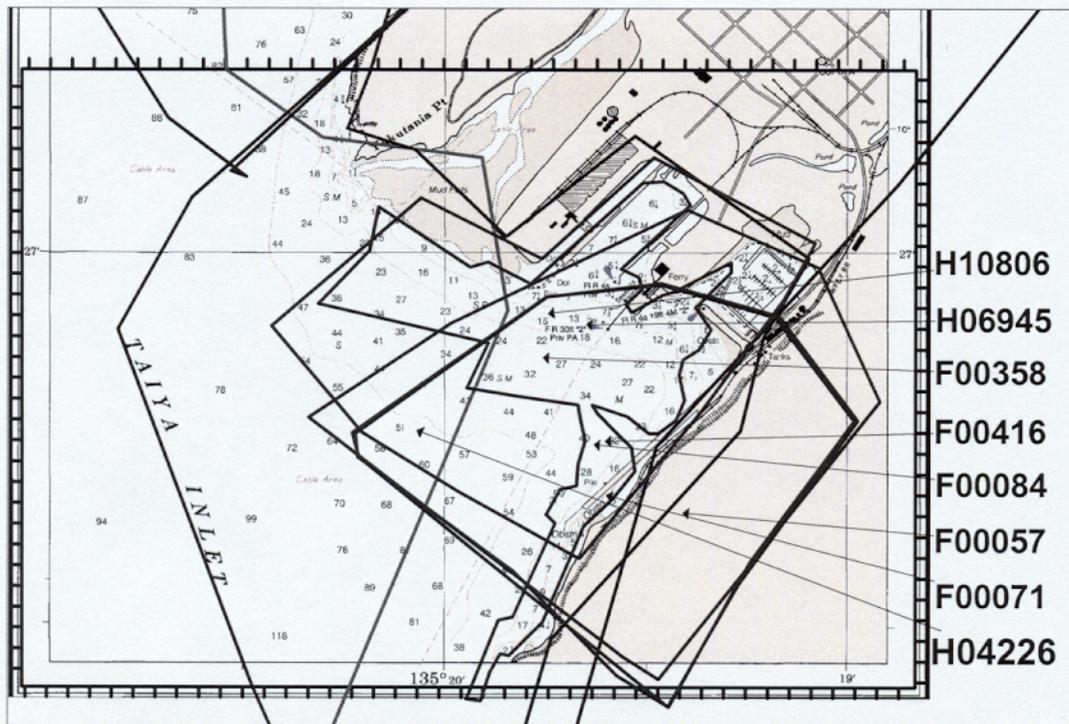


Figure 2: Prior Surveys in Common with H10972

Prior survey H10806 covers the entire area of present survey H10972. Comparison of depths reveals the present and prior survey generally differ by less than one fathom⁵⁴, except in the vicinity of the White Pass and Yukon Corporation commercial pier where the present survey is generally four to five⁵⁵ fathoms deeper than the prior survey. The present differences in depths may be attributed to the improved sounding methods and relative accuracy of the data acquisition process utilized during the present survey.⁵⁶

Prior survey H10806 reported a submerged steel pipe located at 59° 26' 50.79" N, 135° 19' 23.46" W. No further investigation on this obstruction was warranted during this survey since it was sufficiently addressed in 1998. This area has 100% multibeam coverage, with the present survey depths agreeing with the prior depths. The Hydrographer recommends retaining the submerged obstruction.⁵⁷

Final comparisons will be done at the Pacific Hydrographic Branch after reduction to final sounding datum using tidal information collected concurrently with this survey.

E. APPROVAL

As Chief of Party, I have ensured that standard field surveying and processing procedures were followed in producing this examination in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; the Field Procedures Manual, and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for 2000.⁵⁸

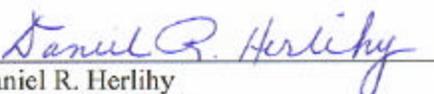
The digital data and supporting records have been reviewed by me, are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to N/CS34, Pacific Hydrographic Branch

Survey H10972 is complete and adequate to supersede charted soundings and features in their common areas. There is no additional work required on this survey.⁵⁹

Listed below are supplemental reports submitted separately which contain additional information relevant to this survey:

| <u>Title</u> | <u>Date Sent</u> | <u>Office</u> |
|---|------------------|---------------|
| Horizontal and Vertical Control Report for S-O905-RA-00 | TBD | N/CS34 |
| Coast Pilot Report for S-O905-RA-00 | TBD | N/CS26 |

Approved and Forwarded:

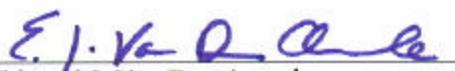

 Daniel R. Herlihy
 Commander, NOAA
 Commanding Officer

In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Survey Sheet Manager:


 Kimberley Sampadian
 Physical Scientist, NOAA

Field Operations Officer:


 Edward J. Van Den Ameerle
 Lieutenant, NOAA

Revisions Compiled During Office Processing and Certification

- ¹ PHB Revision--Strikethrough ~~00.~~
- ² PHB Revision--Strikethrough ~~00.~~
- ³ PHB Revision--Strikethrough ~~15.05"~~ and replace with 08".
- ⁴ PHB Revision--Strikethrough ~~23.97"~~ and replace with 21.5".
- ⁵ PHB Revision--Strikethrough ~~21'02.01"~~ and replace with 19'07.5".
- ⁶ PHB Revision--Strikethrough ~~18'48.99"~~ and replace with 20'43.5".
- ⁷ Filed with the hydrographic data.
- ⁸ Filed with the hydrographic data.
- ⁹ Filed with the hydrographic data.
- ¹⁰ Filed with the hydrographic data.
- ¹¹ Concur
- ¹² Concur
- ¹³ Filed with the hydrographic data.
- ¹⁴ Filed with the hydrographic data.
- ¹⁵ Approved Tide Note dated July 10, 2000 is attached.
- ¹⁶ Concur with clarification. AWOIS item 52619, a $\frac{3}{4}$ *Obstn* (submerged pile), at latitude 59°26'53.8N, longitude 135°19'21.1W, originates from F00358 (1990) and was not investigated by the hydrographer. The present chart depicts this obstruction as 0 fathoms 5 feet. Although the present survey depths in the area of the submerged pile range from 0.8- 1.3 fathoms, the evaluator recommends that the obstruction and associated depth be retained as charted.
- ¹⁷ Chart 17317 inset, 19th Edition, dated August 26, 2000, was used during office processing.
- ¹⁸ Charted depths listed below do not reflect the latest survey compiled to 17317 (H10806, 1998). Chart the areas listed below based on the present survey information.
- ¹⁹ PHB Revision--Strikethrough ~~1.6 fathoms (Pos. #124058)~~ and replace with 2.8 fathoms (Pos. #124061).
- ²⁰ Concur
- ²¹ Concur
- ²² PHB Revision--Strikethrough ~~16.8 fathoms (Pos. #84294)~~ and replace with 19.8 fathoms (Pos. #82466).
- ²³ Concur
- ²⁴ Concur
- ²⁵ PHB Revision--Strikethrough ~~51 fathoms (Pos. #133579)~~ and replace with 53-fathoms (Pos. #133563).
- ²⁶ Concur
- ²⁷ PHB Revision--Strikethrough ~~86 fathoms (Pos. #133977)~~ and replace with 88-fathoms (Pos. #97071).
- ²⁸ Concur
- ²⁹ PHB Revision--Strikethrough ~~102 fathoms (Pos. #91692)~~ and replace with 104-fathoms (Pos. #91942).
- ³⁰ Concur
- ³¹ Concur
- ³² Concur
- ³³ Concur
- ³⁴ Filed with the hydrographic data.

³⁵ Filed with the hydrographic data.

³⁶ Filed with the hydrographic data.

³⁷ The hydrographer found significant changes to two major pier structures (Skagway Terminal Company Pier, White Pass and Yukon Corporation Wharf) as charted in Skagway Harbor. These revisions are based on the 18th edition of chart 17317, dated June 14, 1997. However, since this survey was accomplished, the 19th edition, dated August 26, 2000, has been printed and shows the Skagway Terminal Company Pier nearly identical to the hydrographer's findings. Discussion with the Marine Chart Division provided information that this pier was renovated through a Corps of Engineers permit in 1998 and applied to the chart. The detached positions taken by the hydrographer verify the present charted pier structure. However, the White Pass and Yukon Corporation Wharf should be charted as revised by the hydrographer's findings. Additional information is found in the hydrographer's report, section D.3, and in this report, section O.

³⁸ Concur. These obstructions fall behind a new major pier structure which is no longer accessible to navigation. However, the obstructions have been transferred to the smooth sheet from F00358 based on an incomplete investigation.

³⁹ Concur with clarification. See endnote 37.

⁴⁰ Concur

⁴¹ Filed with the hydrographic data.

⁴² Filed with the hydrographic data.

⁴³ Concur

⁴⁴ The Dangers to Navigation were generated based on the 18th Edition of Chart 17317. The 19th Edition of 17317 came out in August 2000 reflecting the application of H-10806. These reported dangers match up well with the 19th Edition.

⁴⁵ PHB Revision-Strikethrough ~~Appendix I~~ and add this report.

⁴⁶ Concur

⁴⁷ Prior surveys H-10806 and F00358 are the sole source data for the current chart in common with the present survey. The present survey was compared to a digital copy of H-10806 which includes prior survey data brought forward from F00358. The registration and legibility of this digital copy to the present survey work was good. Differences in depths generally range from 0-2 fathoms throughout the survey area and reflect no consistent bias of shoaling and or an increase in depths. The greatest depth discrepancies with the prior survey (2-4 fathoms) are seen in isolated areas offshore of the White Pass and Yukon Corporation's commercial wharf where the bottom slopes off rapidly into the harbor. Present survey depths in the small boat marina reflect very little change since 1990. Depth differences are largely attributed to the recent cultural activity within Skagway Harbor. The use of different sounding collection systems may account for some differences along the more steeply sloping bottom areas.

With the exception of a few soundings and features transferred from the prior surveys, survey H-10972 is adequate to supersede the prior work within the common area.

| | | | | |
|--|-------------------|---------------------|-----------------|-------------------|
| ⁴⁸ PHB Revision-Strikethrough | H04226 | 1:40,000 | 1922 | Valdez |
| ⁴⁹ PHB Revision-Strikethrough | H06945 | 1:2,000 | 1943 | NAD27 |
| ⁵⁰ PHB Revision-Strikethrough | F00057 | 1:1,000 | 1945 | NAD27 |
| ⁵¹ PHB Revision-Strikethrough | F00071 | 1:2,000 | 1948 | NAD27 |
| ⁵² PHB Revision-Strikethrough | F00084 | 1:2,000 | 1950 | NAD27 |

⁵³ PHB Revision-Strikethrough ~~F00416~~ ~~1:5,000~~ ~~1995~~ ~~NAD83~~

⁵⁴ PHB Revision-Strikethrough ~~one fathom~~ and add two fathoms

⁵⁵ PHB Revision-Strikethrough ~~Appendix I.~~ and add two to four

⁵⁶ Concur with clarification. Depth differences are largely attributed to the recent cultural activity within Skagway Harbor. The use of different sounding collection systems may account for some differences along the more steeply sloping bottom areas. Additional information is found in the hydrographer's report, section D.6.

⁵⁷ Concur

⁵⁸ Concur

⁵⁹ Concur with clarification. With the exception of a few soundings and features transferred to the present survey, H-10972 is adequate to supersede the prior work within the common area.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Marine and Aviation Operations
Marine Operations Center
 1801 Fairview Avenue East
 Seattle, Washington 98102-3767

NOAA Ship RAINIER

August 16, 2000

Commander (mon)
 Seventeenth Coast Guard District
 Post Office Box 25517
 Juneau, Alaska 99802-5517

**ADVANCE
 INFORMATION**

Dear Sir:

It is requested that the following dangers to navigation be included in the Local Notice to Mariners. The NOAA Ship RAINIER positioned these features while conducting hydrographic survey H10972 in Skagway Harbor, Alaska, in May 2000. The dangers are shown graphically on the attached chartlet.

The following dangers to navigation affect the following charts:

| <u>Chart</u> | <u>Scale</u> | <u>Edition</u> | <u>Date</u> |
|--------------|--------------|----------------|-----------------|
| 17317 | 1:77,182 | 18th | 14-June-97 |
| 17317 inset | 1:10,000 | 18th | 14-June-97 |
| 17300 | 1:209,978 | 28th | 12-September-98 |

The positions are on the NAD 83 datum and depths have been corrected to Mean Lower Low Water.

| <u>Feature</u> | <u>Depth (fm)</u> | <u>Latitude (N)</u> | <u>Longitude (W)</u> | <u>Depth (m)</u> |
|----------------|-------------------|---------------------|----------------------|------------------|
| Shoal | 7 | 59° 27' 3.338" | 135° 20' 10.011" | 13.1 |
| Shoal | 4 ½ | 59° 27' 0.447" | 135° 20' 2.744" | 8.3 |
| Shoal | 2 ½ | 59° 27' 2.416" | 135° 20' 6.319" | 4.9 |

This is advance information subject to office review. Questions concerning this letter should be directed to the Chief, Pacific Hydrographic Branch, (206) 526-6835. Refer to survey project S-O905-RA-00 and Danger to Navigation message RA-03-00. More information on current RAINIER survey projects may be obtained by e-mail; contact the Field Operations Officer at FOO.RAINIER@NOAA.GOV.

Sincerely,

Daniel R. Herlihy
 Commander, NOAA
 Commanding Officer

Attachment

cc: NIMA
 N/CS261
 PMC
 N/CS34



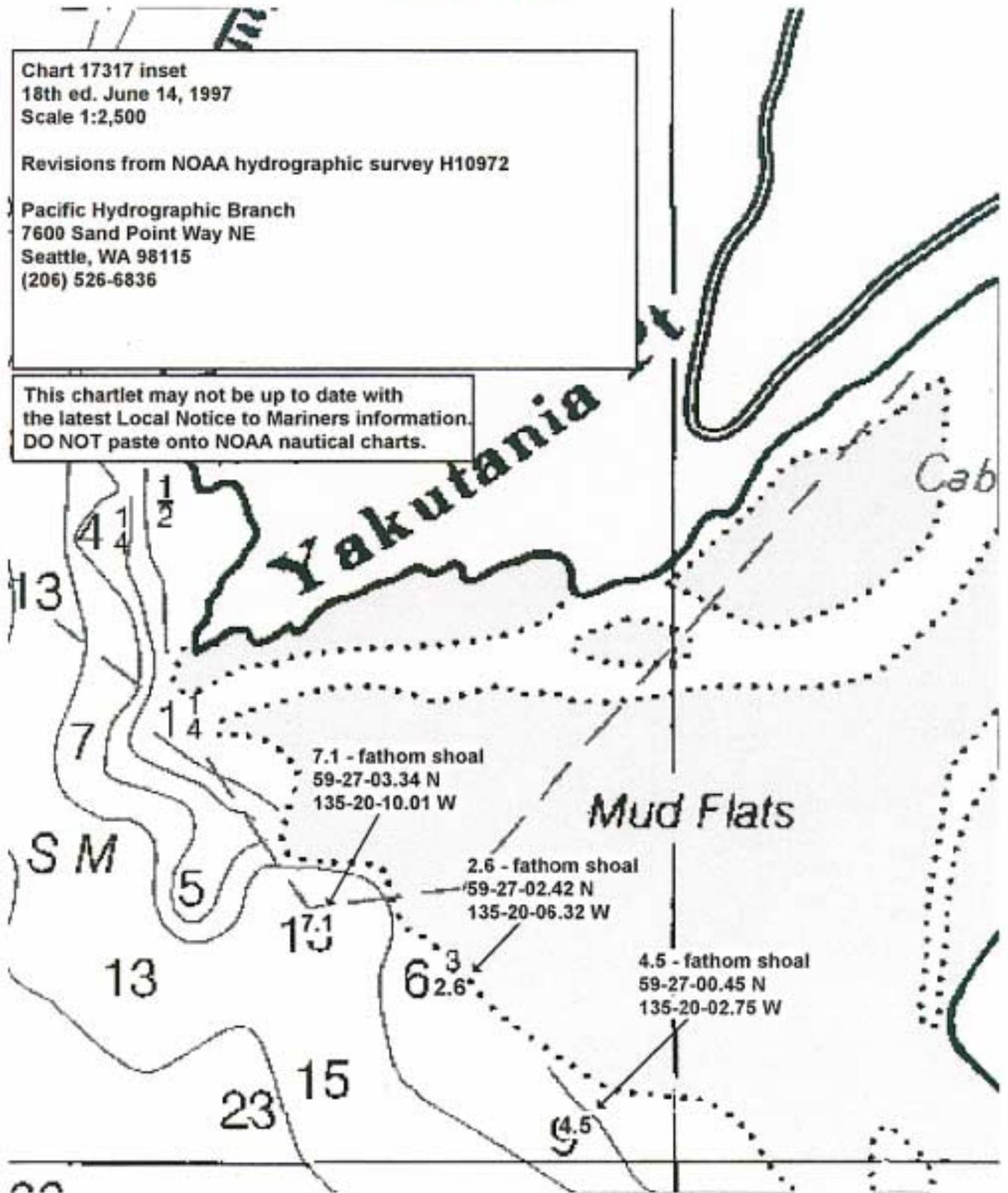
ADVANCE
INFORMATION

Chart 17317 inset
18th ed. June 14, 1997
Scale 1:2,500

Revisions from NOAA hydrographic survey H10972

Pacific Hydrographic Branch
7600 Sand Point Way NE
Seattle, WA 98115
(206) 526-6836

This chartlet may not be up to date with
the latest Local Notice to Mariners information.
DO NOT paste onto NOAA nautical charts.





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: July 10, 2000

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-0905-RA-2000
HYDROGRAPHIC SHEET: H-10972

LOCALITY: Skagway Harbor, AK
TIME PERIOD: May 2 - 3, 2000

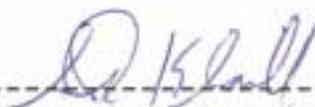
TIDE STATION USED: 945-2400 Skagway, AK
Lat. 59° 27.0'N Lon. 135° 19.6'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.799 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SEA78.

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time.

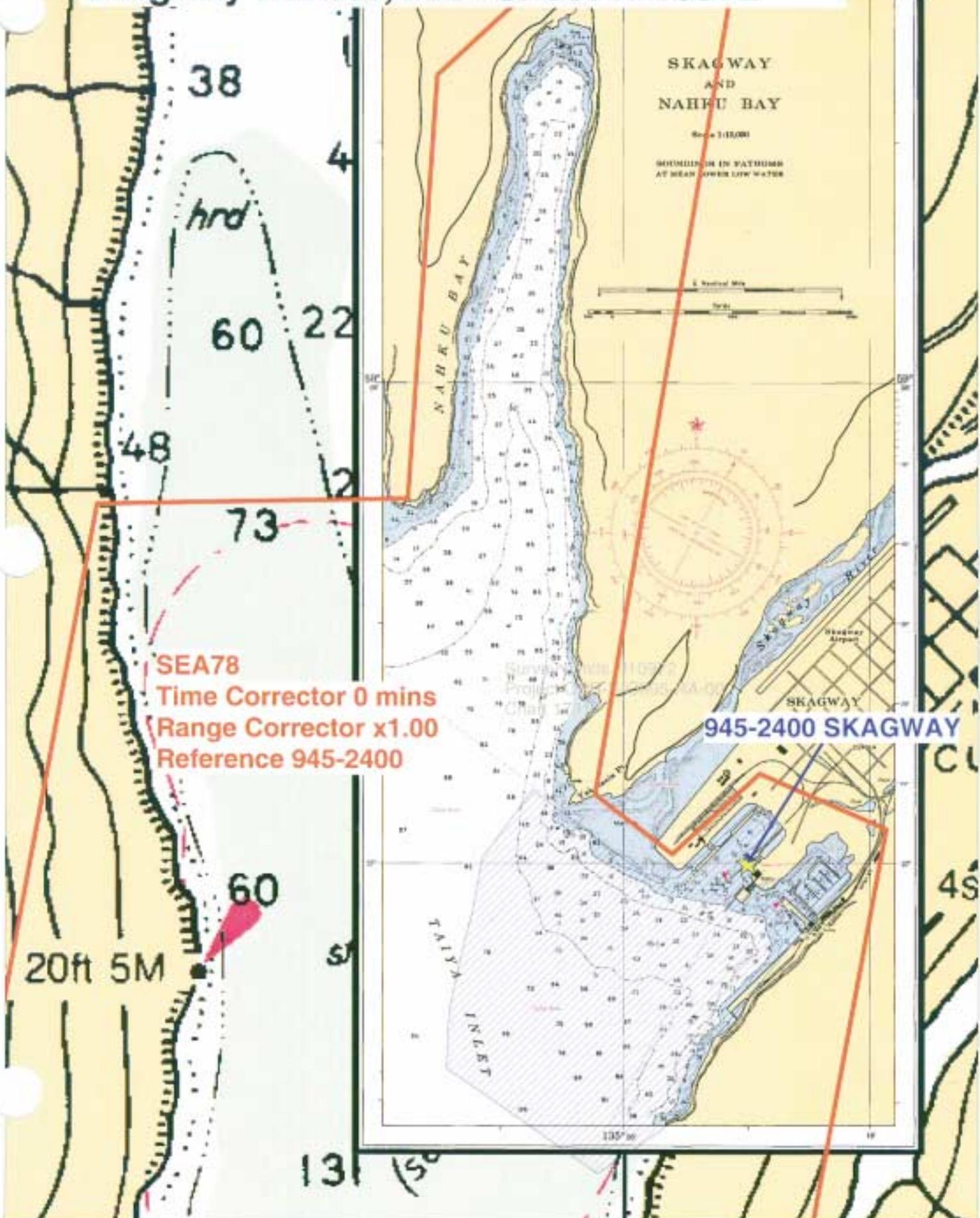
Note 2: The Lynn Canal, AK area shows anomalous sea level trends due to land emergence resulting from glacial retreat. Therefore, the accepted datums at 945-2400 Skagway, AK are based on the 1994-1998 update of Mean Sea Level (MSL) on the 1960-78 Epoch.

For 

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION



Final Tidal Zoning for OPR-0905-RA-2000 Skagway Harbor, AK - Sheet H-10972



Final tide zone node point locations for OPR-O905-RA-2000,
Sheet H-10972.

Format: Longitude in decimal degrees (negative value denotes
Longitude West),
Latitude in decimal degrees
Tide Station (in recommended order of use)
Average Time Correction (in minutes)
Range Correction

| | Tide Station Order | AVG Time Correction | Range Correction |
|-----------------------|-----------------------|------------------------|---------------------|
| Zone SEA78 | | | |
| -135.407735 59.295667 | 945-2400 | 0 | 1.00 |
| -135.401593 59.373623 | | | |
| -135.369098 59.462448 | | | |
| -135.348022 59.462637 | | | |
| -135.346 59.477349 | | | |
| -135.33772 59.481248 | | | |
| -135.325926 59.480755 | | | |
| -135.335279 59.452373 | | | |
| -135.330076 59.450301 | | | |
| -135.324204 59.453092 | | | |
| -135.315603 59.451166 | | | |
| -135.334753 59.398516 | | | |
| -135.362768 59.289021 | | | |
| -135.407735 59.295667 | | | |

HYDROGRAPHIC SURVEY STATISTICS

RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.

| RECORD DESCRIPTION | | AMOUNT | RECORD DESCRIPTION | | | AMOUNT |
|--------------------|-------------------|----------------------|------------------------------------|-----------|----------------------------|--------|
| SMOOTH SHEET | | | SMOOTH OVERLAYS: POS., ARC, EXCESS | | | |
| DESCRIPTIVE REPORT | | | FIELD SHEETS AND OTHER OVERLAYS | | | |
| DESCRIP-TION | DEPTH/POS RECORDS | HORIZ. CONT. RECORDS | SONAR-GRAMS | PRINTOUTS | ABSTRACTS/SOURCE DOCUMENTS | |
| ACCORDION FILES | | | | | | |
| ENVELOPES | | | | | | |
| VOLUMES | | | | | | |
| CAHIERS | | | | | | |
| BOXES | | | | | | |

SHORELINE DATA

- SHORELINE MAPS (List):
- PHOTOBATHYMETRIC MAPS (List):
- NOTES TO THE HYDROGRAPHER (List):
- SPECIAL REPORTS (List):
- NAUTICAL CHARTS (List):

OFFICE PROCESSING ACTIVITIES
The following statistics will be submitted with the cartographer's report on the survey

| PROCESSING ACTIVITY | AMOUNTS | | |
|--|--------------|------------|--------|
| | VERIFICATION | EVALUATION | TOTALS |
| POSITIONS ON SHEET | | | |
| POSITIONS REVISED | | | |
| SOUNDINGS REVISED | | | |
| CONTROL STATIONS REVISED | | | |
| | TIME-HOURS | | |
| | VERIFICATION | EVALUATION | TOTALS |
| PRE-PROCESSING EXAMINATION | | | |
| VERIFICATION OF CONTROL | | | |
| VERIFICATION OF POSITIONS | | | |
| VERIFICATION OF SOUNDINGS | | | |
| VERIFICATION OF JUNCTIONS | | | |
| APPLICATION OF PHOTOBATHYMETRY | | | |
| SHORELINE APPLICATION/VERIFICATION | | | |
| COMPILATION OF SMOOTH SHEET | | | |
| COMPARISON WITH PRIOR SURVEYS AND CHARTS | | | |
| EVALUATION OF SIDE SCAN SONAR RECORDS | | | |
| EVALUATION OF WIRE DRAGS AND SWEEPS | | | |
| EVALUATION REPORT | | | |
| GEOGRAPHIC NAMES | | | |
| OTHER (Chart Compilation) | | | |
| USE OTHER SIDE OF FORM FOR REMARKS | TOTALS | | |

| | | |
|-------------------------------|----------------|-------------|
| Pre-processing Examination by | Beginning Date | Ending Date |
| Verification of Field Data by | Time (Hours) | Ending Date |
| Verification Check by | Time (Hours) | Ending Date |
| Evaluation and Analysis by | Time (Hours) | Ending Date |
| Inspection by | Time (Hours) | Ending Date |

APPROVAL SHEET
H10972

Initial Approvals:

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The survey records and digital data comply with NOS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

Bruce A. Olmstead
for Dennis Hill Date: 8/28/03
Chief, Cartographic Team
Pacific Hydrographic Branch

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.

J. E. Lowell, Jr.
John E. Lowell, Jr. Date: 9/18/03
Commander, NOAA
Chief, Pacific Hydrographic Branch

AW013/sure

1/7/04
mcr

